

REMARKS

Claims 1-170 are now pending in the application. Claims 143 and 170 have been amended. Claims 1, 110, 131 and 154 are independent. Reconsideration of this application, as amended, is respectfully requested.

Claim Objections

Applicants appreciate the Examiner's assistance with respect to claims 143 and 170. Applicants have amended claims 143 and 170 as suggested by the Examiner to address the minor informalities identified by the Examiner in the office action. Accordingly, this objection has been obviated and/or rendered moot by the non-narrowing amendments to these claims.

Rejection Under 35 U.S.C. § 103

Claims 1-8, 11-17, 22-24, 28-41, 46-58, 81, 83-87, 92, 100-114, 199-125, 130-133, 136, 141-161, 168 and 169 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Coffee, USPN 6,595,208 in view of Tisone, USPN 6,063,339. Claims 1-19, 22-26, 28-43, 46-66, 69-96, 98-116, 119-135, 137-138, 141-165 and 168-170 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gray, USPN 6,041,801 in view of Coffee further in view of Tisone. Claims 9-10, 19, 25-26, 42-43, 66, 69-74, 82-88, 115-116, 137-138 and 162-165 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gray in view of Coffee as applied to claims above,

and further in view of Sugahara, USPN 5,508,726. These rejections are respectfully traversed.

Applicants submit that the prior art of record fails to teach or suggest each and every limitation of the unique combination of limitations of the claimed invention. For example, with respect to claim 1, Applicants submit that the prior art of record fails to teach or suggest the unique combination of limitations of the claimed invention, including the feature(s) of: "a divider barrier for separating system and sample liquid within the assembly, the divider barrier comprising a body of elastomeric substantially incompressible material."

With respect to claim 110, Applicants submit that the prior art of record fails to teach or suggest the unique combination of limitations of the claimed invention, including the feature(s) of: "a divider barrier for separating the main bore into a system liquid reservoir and a sample liquid reservoir and comprising a body of elastomeric substantially incompressible material."

With respect to claim 131, Applicants submit that the prior art of record fails to teach or suggest the unique combination of limitations of the claimed invention, including the feature(s) of: "a divider barrier for separating the main bore into a system liquid reservoir and a sample liquid reservoir and comprising a body of elastomeric substantially incompressible material."

With respect to claim 154, Applicants submit that the prior art of record fails to teach or suggest the unique combination of limitations of the claimed invention,

including the feature(s) of: "a divider barrier mounted between the inner part and the nozzle mounting part to separate the liquid reservoirs and comprising a body of elastomeric substantially incompressible material." Accordingly, these rejections should be withdrawn.

A distinguishing feature of the present invention is when using a positive displacement pump, such as described in Tisone, to overcome the problem of the compressibility of air bubbles which are located between the system liquid and sample liquid. With an air bubble, there is the additional problem of the mixing of system and sample liquid. The present invention is directed towards overcoming these problems by using an incompressible membrane. To suggest that a diaphragm pump does in some way disclose the present invention is incorrect. Diaphragm pumps are well known and it is well known to have pumping arrangements with diaphragm pumps. One could use a diaphragm pump with the present invention but only to replace the positive displacement pump. This is all that is described in Coffee.

Coffee describes the introduction of liquid into a chamber having a closed outlet. Then a valve is closed to shut off the connection between the reservoir and the chamber. Then the diaphragm pump is operated to pump liquid out of the chamber. There is no system liquid disclosed in Coffee. The membrane 57 is essentially a flexible piston which is connected to a piezoactuator. The piezoactuator and the membrane piston slowly force the liquid out towards the nozzle to provide the aerosol device.

In the present invention, the membrane is a separator aimed at preventing mixing two liquids on both sides of the membrane. The invention relates to solving the problem of the use of a system liquid pumped by, for example, a piston pump, to dispense sample liquid. It is crucial that there be liquids present on both sides of the membrane during some stage of operation of the device. It is submitted that Coffee discloses only one liquid, namely the sample liquid. In the cited specification of Coffee, the piezoactuator moves the plunger membrane and therefore the piezoactuator pushes liquid. This is a fundamental difference between the invention of the present application and the cited specification. As accepted by the Examiner, it is precisely because of this difference that Coffee does not use a positive displacement pump to meter the volume.

Further, it is important to appreciate that the type of membrane that would be ideal for use with the present invention would not work in the apparatus of Coffee and vice versa. For example, the ideal membrane for use in the present invention is a flexible thin sheet of rubber with a thickness of some 100 microns or so. If one utilized such a membrane in the cited apparatus of Coffee and connected it to a piezoactuator, it would not work at all. For a diaphragm pump to operate, the membrane must be flexible but relatively stiff, namely, it must be a relatively stiff sheet of plastics or, more often, metal foil, so that it will transfer the movement of the piezoactuator to the other sides of the membrane.

The Examiner's attention is also drawn to the fact that Coffee uses the term "flexible diaphragm (57)" (see column 8, line 40) and not, an elastomeric substantially

incompressible material as in the claimed invention. Applicants submit that it is improper to equate this device to an elastomeric, substantially incompressible material.

The Examiner has cited a specification by Tisone et al, and forms what is part of the well known prior art. Indeed, another application of Tisone, namely, US Patent No. 5,741,554 is cited in the present specification which operates substantially similarly to the specification cited by the Examiner. What this teaches, we would respectfully submit, is the correct matching of the timing between the movement of the plunger of the syringe pump and the actuation of the valve of the dispenser. The present invention is not about dispensing multiple drops of the same liquid. It is for the dispensing of a single droplet of a predetermined size accurately.

It is respectfully suggested that the Examiner is incorrect in assuming that because it is known for Coffee to have a microprocessor capable of determining certain voltages and operating them correctly to achieve the object of his invention, it is then obvious to one of ordinary skill that a microprocessor is capable of activating the receiving electrode separately. It may be perfectly capable of doing so, however, to suggest that the arrangement of the present invention is then obvious is taking too much from the disclosure of Coffee as Coffee does not suggest this modification.

Further, Applicants respectfully submit that to combine the disclosure of Tisone with Coffee, when clearly the present invention is directed towards improving on the devices such as disclosed by Tisone, is improper.

It is respectfully submitted that the objection that the cited claims should be rejected under 35 U.S.C. 103(a) as being unpatentable over Gray (US 6,041,801) in view of Coffee, further in view of Tisone, should be withdrawn. The only similarity between Gray and the present invention is the use of a membrane. This is a system for creating pressure variations on one side of the membrane utilizing a reservoir tank (17) that releases a time varying amount of second fluid into a chamber separated by a membrane from the first fluid flowing through the tube of the system, such as, for example, a drug or other medicament. The second fluid in this specification of Gray is preferably gas (col. 3, line 1). This is also different from the present invention where the fluid is clearly a liquid. The purpose of the invention of Gray is that a transducer measures the pressure in the second fluid and if the flow of the first fluid stops, then the pattern of the pressure changes and this is detected by the transducer. It is also submitted that this does not dispense a metered amount to the first fluid. There are hundreds of pieces of apparatus that use membranes in this way. This does not disclose a manner in which the problems, discussed in the present specification, could be solved. The membrane is a substitution for an air bubble and it has the feature of being incompressible.

To suggest that because Coffee discloses various arrangements of voltage ramping and voltage generating means, it would be obvious to one having ordinary skill in the art of the invention to modify the apparatus in order to increase the precision of

the quantity of liquid sample dispensed, is incorrect, e.g., this is taking the object of the present invention and changing it into a totally different object.

If one were to use a positive displacement pump with Coffee, there would no longer be a steady flow of liquid and therefore the object of Coffee would be totally negated by using a positive displacement pump of Tisone.

The rejection under 35 U.S.C. 103(a), that the invention is unpatentable over Gray in view of Coffee, as applied to the claims and further in view of Sugahara, should be withdrawn. It is submitted that Sugahara discloses a pressure generator for ink jet applications and there is no mention in the present invention of a generator to cause a wave in the sample liquid.

Allowable Subject Matter

Claims 20-21, 27, 44-45, 67-68, 97, 139-140 and 166-167 stand objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants greatly appreciate the indication of the allowable subject matter by the Examiner.

CONCLUSION

Since the remaining references cited by the Examiner have not been utilized to reject the claims, but merely to show the state-of-the-art, no further comments are deemed necessary with respect thereto.

All the stated grounds of rejection have been properly traversed and/or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently pending rejections and that they be withdrawn.

It is believed that a full and complete response has been made to the Office Action, and that as such, the Examiner is respectfully requested to send the application to Issue.

In the event there are any matters remaining in this application, the Examiner is invited to contact Paul C. Lewis, Registration No. 43,368 at (703) 205-8000 in the Washington, D.C. area.

Dated: June 29, 2005

Respectfully submitted,

By 

Paul C. Lewis

Registration No.: 43,368

BIRCH, STEWART, KOLASCH & BIRCH, LLP

8110 Gatehouse Rd

Suite 100 East

P.O. Box 747

Falls Church, Virginia 22040-0747

(703) 205-8000

Attorney for Applicant

PCL/cl